REMARKS

Claims 1-3, 5-24 and 26-32 are presented in this application for the Examiner's review and consideration. Claims 2 and 5 have been cancelled without prejudice. Claims 1, 3, 9, 12, 13, 15, 20, 21 and 24 have been amended to more particularly define the invention under Section 112, second paragraph. Claims 29-32 are newly added. The claim amendments and additions are fully supported in the originally filed application and do not introduce new matter.

Inventor Declaration

Applicant has filed a declaration by applicant Mr. Bruce Faure under 37 C.F.R. §1.132 (the "Declaration") concurrently herewith which supports the foregoing statements in order to overcome the current rejections by the Examiner. The declaration provides additional support for Applicant's position that the pending claims are allowable and patentable in view of Goesele.

Rejection under 35 U.S.C. § 103(a)

Claims 1-3, 5-24, and 26-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,150,239 to Goesele et al. ("Goesele"). Claims 2 and 5 have been cancelled. Accordingly, the rejection as to claims 2 and 5 is moot.

Claim 1 recites providing a crystalline base substrate that includes a zone of weakness and growing a stiffening layer on that base substrate.

Goesele specifically discloses epitaxially growing a layer(s) of monocrystalline material on a monocrystalline substrate to form a first substrate and, thereafter, forming an implantation zone (Goesele, col. 9, lines 26-44). In particular, hydrogen is implanted after epitaxial growth. As declared by Mr. Faure, one of ordinary skill in the art, reading Goesele, would not find any teaching or suggestion to epitaxially grow a layer of material on a base substrate that already has a zone of weakness as recited in present claim 1. (Declaration, ¶ 7.) Accordingly, Goesele does not disclose, teach, or suggest providing a crystalline base substrate that includes a zone of weakness and thereafter growing a stiffening layer on the base substrate.

Goesele specifically discusses the disadvantage of methods that split substrates at temperatures higher than 500°C (Goesele, col. 2, line 63 - col. 3, line 12). Goesele states that high splitting temperatures prevent economical application of the method to transfer

monocrystalline thin layers onto a dissimilar substrate with a substantially different thermal expansion coefficient (Id.). Goesele requires the first substrate to be split at low temperatures (e.g., 200°C, 385°C) to achieve stated advantages, including the reduction of microroughness of the surface of a transferred layer as well as avoiding as much implantation induced damage as possible (col. 3, lines 37-56; col. 11, line 11; col. 12, line 46). As such, Goesele specifically teaches away from using higher temperatures for splitting. (Declaration, ¶ 8.) Thus, as declared by Mr. Faure, one of ordinary skill in the art, reading Goesele, would not find any suggestion to epitaxially grow a layer of material on a base substrate that already has a zone of weakness as recited in claim 1. (Id.) Epitaxially growth of a layer of material is generally performed at high temperatures (*e.g.,* between about 400°C and about 1500°C). (Id.) If a monocrytalline material were epitaxially grown on a monocrytalline substrate that already has an implantation zone, the implantation zone would be exposed to high temperatures that would cause splitting therein. (Id.) Accordingly, for this additional reason, Goesele does not disclose, teach or suggest providing a crystalline base substrate that includes a zone of weakness and growing a stiffening layer on the base substrate.

Moreover, epitaxially growing a layer of monocrystalline material on a monocrystalline substrate that already has an implantation zone would render Goesele inoperative, because splitting would occur before the epitaxial layer could be completely formed. (Declaration, ¶ 9.)

Claim 1 also recites detaching the stiffening layer and carrier sublayer from the remainder of the base substrate at the zone of weakness to obtain a carrier substrate and growing a high quality, epitaxial film on the carrier substrate. In other words, claim 1 recites that the stiffening layer and carrier sublayer are separated from the remainder of the base layer *before growing* an epitaxial film on the stiffening layer. This language of claim 1 is contrary to the teaching of Goesele for the following reasons.

Goesele specifically discloses bonding a first monocrystalline substrate (having a monocrystalline epitaxial layer) to a second substrate such as fused quartz (Goesele, col. 4, lines 5-12; col. 5, lines 12-14; col. 9, lines 26-51). One of ordinary skill in the art would have understood that the second substrate of Goesele is used to provide the additional thickness that is necessary to form a self-supporting structure capable of further processing. (Declaration, ¶ 11.) Thus, there is no need in Goesele to provide additional epitaxial growth on the monocrystalline

substrate to achieve a necessary thickness to form a self-supporting structure. (Declaration, ¶ 11.) Accordingly, Goesele does not disclose, teach or suggest separating the stiffening layer and carrier sublayer from the remainder of the base layer *before growing* an epitaxial film.

Goesele specifically discloses epitaxially growing a layer(s) of monocrystalline material on a monocrystalline substrate to form a first substrate and, thereafter, splitting the first substrate at the monocrystalline substrate (Goesele, col. 9, lines 26-44). Claim 1 of the application is directed to separating the stiffening layer and carrier sublayer from the remainder of the base layer to obtain a carrier substrate, followed by growing a high quality epitaxial film on the carrier substrate (*i.e.,* splitting followed by epitaxial growth). (Declaration, ¶ 12.) Thus, the Goesele teachings is backwards from claim 1. Accordingly, for this additional reason, Goesele does not disclose, teach or suggest separating the stiffening layer and carrier sublayer from the remainder of the base layer *before growing* an epitaxial film. Moreover, since splitting occurs before additional epitaxial growth, the present application provides the surprising advantage of allowing additional epitaxial growth at high temperatures without concern for prematurely splitting the substrate. (Id.) Epitaxially growing at high temperatures results in a high quality film. (Id.)

As all the features recited in independent claim 1, as amended, are not disclosed, taught or suggested by Goesele, Applicant submits that this claim is allowable over Goesele. Dependent claims 3, 6-24 and 26-28 are dependent from independent claim 1 and are allowable for at least the same reason as discussed above in connection with claim 1.

Claim 24 recites a surface of a carrier substrate having a surface roughness between approximately 20 Å RMS and about 200 Å RMS. Claim 28 recites providing a surface roughness that is sufficient to securely hold the carrier substrate in position on the remainder of the base substrate.

Goesele discusses the disadvantages of having a transferred layer with a roughness that requires additional polishing steps (Goesele, col. 3, lines 13-30). Thus, Goesele attempts to minimize surface roughness (Goesele, col. 3, lines 37-48). (Declaration, ¶ 13.) Claims 24 and 28, on the other hand, recites just the opposite - providing a roughness which is sufficient enough to securely hold a carrier substrate is position on a base substrate during further processing of the carrier substrate (*e.g.,* additional epitaxial growth). (Id.) Such a roughness would necessitate polishing and, thus, is contrary to the Goesele. (Id.) One skilled in the art,

reading Goesele, would not find any suggestion to provide a surface roughness which is sufficient to securely hold the carrier substrate on the base substrate as recited in claims 24 and 28. (Id.)

Claims 2 and 5

Claims 2 and 5 have been cancelled for reasons unrelated to patentability.

New claims 29-32

Claims 29 and 30 are dependent from independent claim 1 and are allowable for at least the same reason as discussed above in connection with claim 1.

New claim 29 recites that the carrier substrate is retained in position against the remainder of the base substrate during the growth of the high quality epitaxial film. Goesele discloses attaching a second substrate to the first substrate having the epitaxially grown layer prior to splitting to provide support for the first substrate during splitting. (Declaration, ¶ 14.) Also, in Goesele the growth is not only before splitting but before a weakened area is ever formed. The invention of claim 29 provides the surprising advantage of allowing additional epitaxial growth without the need to bond to another substrate to provide a self-supporting structure, even though the carrier substrate is already detached. (Id.) Goesele does not suggest retaining a substrate in position against the remainder of a base substrate after splitting as recited in claim 29. (Id.) Accordingly, Goesele does not teach or suggest the invention of claim 29.

Goesele does not teach or suggest all the limitations of claim 31 for at least the same reasons as discussed above with regard to claim 1. Claim 32 is dependent from independent claim 31 and is allowable for at least the same reason as discussed above in connection with claim 31.

In light of the presented amendments and remarks, a notice of allowance is respectfully requested. Should the Examiner have any questions or concerns regarding the amendments, remarks or the above-identified application, then an interview with the undersigned is respectfully requested to discuss any such questions or concerns and to accelerate the allowance of the above-identified application.

Respectfully submitted,

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